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TIMING-BASED ASSISTANT CONTROLS

ABSTRACT

A virtual, intelligent, or computational assistant (e.g., also referred to simply as an “assistant”) is described that is configured to provide time-based controls of automation devices (e.g., lights, speakers, ovens, thermostats, sprinklers, heaters, etc.). Assistants may cause automation devices to perform actions (e.g., adjusting a climate control setting, opening a garage door, unlocking an entry door, turning on one or more lights, playing music, adjusting temperature, brewing coffee, preheating an oven, disabling an alarm, etc.) in response to requests that include timing parameters. Timing parameters can be in the form of a delay (e.g., turn off the lights in 5 minutes), a duration (e.g., turn on the lights for 5 minutes), combination delay and duration (e.g., in 5 minutes, turn on the lights for 10 minutes), or the like. The timing parameters can be based on the current time (e.g., unlock the door in 3 minutes) or some other event (e.g., close the garage door 4 minutes after I leave).

DESCRIPTION

Virtual, intelligent, or computational assistants (e.g., also referred to simply “assistants”) execute on counter-top devices, mobile phones, automobiles, and many other type of computing devices. Assistants output useful information, responds to users’ needs, or otherwise performs certain operations to help users complete real-world and/or virtual tasks. Some assistants may trigger automation devices to perform automation actions to satisfy user requests.

The example system shown in FIG. 1 provides an assistant architecture that enables users to specify time constraints when requesting performance of automation actions. For example, a

user may verbally request that the assistant perform an automation action for a specified period of time (e.g., the user may say “turn on the hall light for 5 minutes”). In response to the request, the assistant may perform the automation action for the specified period (e.g., the assistant may turn on the hall light right away and turn off the hall light after 5 minutes have passed).

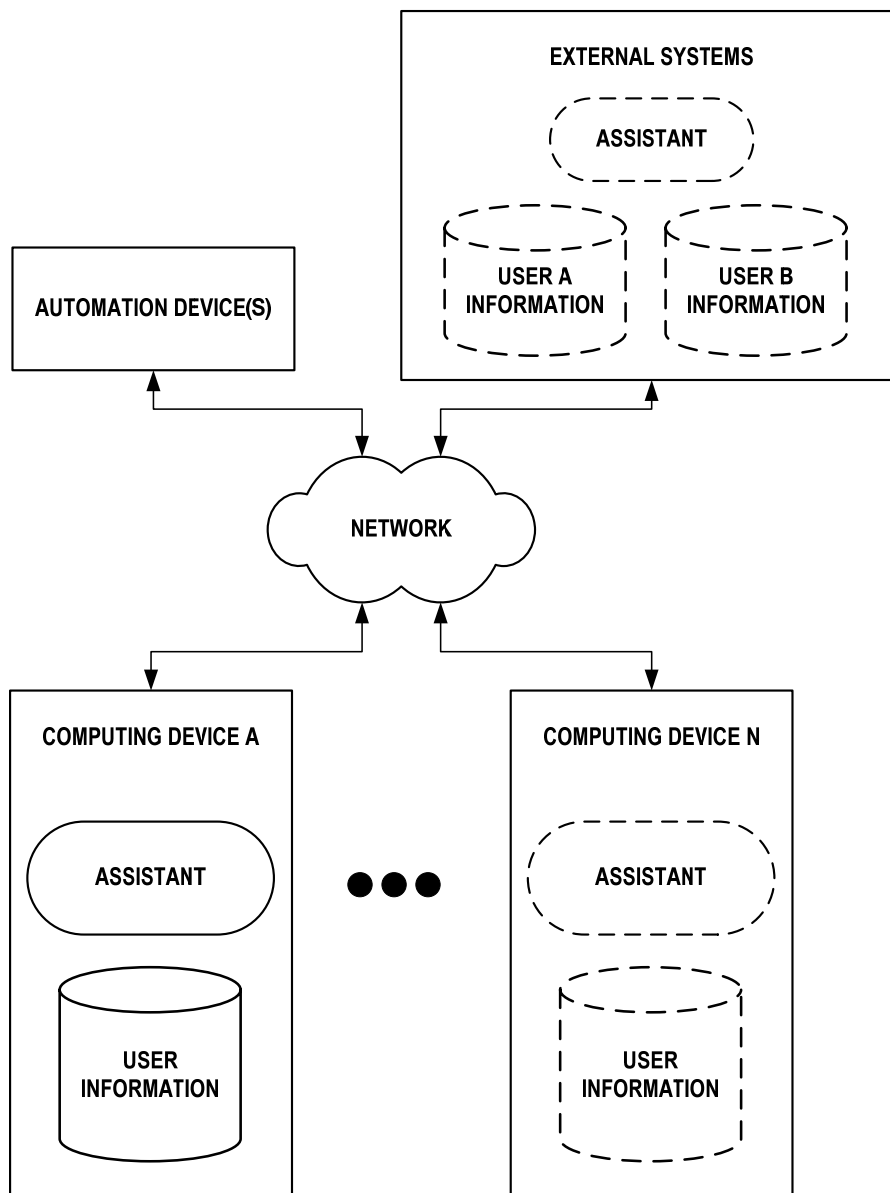


FIG. 1

The system of FIG. 1 includes one or more external systems and computing devices A–N communicating across a network with each of computing devices A–N executing an assistant that maintains user information. The network of FIG. 1 represents a combination of any one or more public or private communication networks, for instance, television broadcast networks, cable or satellite networks, cellular networks, Wi-Fi networks, broadband networks, and/or other type of network for transmitting data (e.g., telecommunications and/or media data) between various computing devices, systems, and other communications and media equipment. Computing devices A–N represent any type of computing device, server, or other system that is configured to execute an assistant and communicate on a network. The external systems represent any type of server, cloud computing environment, or other computing system that is configured to support the assistants executing at computing devices A–N.

The external systems and computing devices A–N can be personal computing devices. In some examples, the external systems and/or computing devices A–N may be shared assets of multiple users. Examples of computing devices A–N include mobile phones, tablet computers, wearable computing devices, countertop computing devices, home automation computing devices, laptop computers, desktop computers, televisions, stereos, automobiles, and any and all other type of mobile and non-mobile computing device that is configured to execute an assistant. For example, computing device A may be a countertop assistant device and computing device N may be a mobile phone or automobile infotainment system.

An assistant executes across any combination of external systems and computing devices A–N to provide assistant services to users of computing devices A–N. Examples of assistant services include: setting up reminders, creating calendar entries, booking travel, online ordering, sending messages or other communications, controlling televisions, lights, thermostats,

appliances, or other computing devices, providing navigational instructions, or any other conceivable task or operation that may be performed by an assistant.

The system of FIG. 1 also includes one or more automation devices communicating across a network with any combination of computing devices A–N. Examples of automation devices include, but are not limited to, locks, lights, powered blinds or other window coverings, garage door openers, lawn sprinklers, fans, smoke and/or carbon monoxide detectors, kitchen appliances, speakers, thermostats or other climate control devices, security cameras, alarm systems, doorbells, chargers, pet food dispensers, leak and/or flood sensors, energy monitoring devices, televisions or other audio/video devices, powered mattresses, etc. capable of sending and receiving information both to and from the network. The automation devices may be referred to as so called smart devices or internet-of-things (IoT) devices. The automation devices may home automation devices in that automation devices may be located in, on, or around a residence. However, in general, the automation devices may be located in, on, or around any setting including commercial (e.g., retail, office, and the like), residential, industrial, governmental (e.g., airport, municipal, military, and the like), or other settings.

Each of the automation devices may be configured to perform one or more automation actions. As one example, a door or window lock of the automation devices may be configured to perform a lock action that locks the door or window and an unlock action that unlocks the door or window. As another example, a garage door opener of the automation devices may be configured to perform an open action that opens a garage door in communication with the garage door opener and a close action that closes the garage door in communication with the garage door opener. As another example, a thermostat of the automation devices may be configured to perform a temperature adjustment action (e.g., to raise or lower the temperature set-point), a

humidity adjustment action (e.g., to raise or lower the humidity set-point), a fan activation action (e.g., to activate a fan of a heating ventilation and air-conditioning (HVAC) system), and/or a fan deactivation action (e.g., to deactivate a fan of a HVAC system).

The automation devices may perform automation actions in response to receiving requests from other devices, such as computing devices A–N or the assistant system. For instance, a pet food dispenser of the automation devices may perform a dispense-food action in response to receiving a request from the assistant (e.g., the network) to perform the dispense-food action.

As a user interacts with the assistant, the assistant may obtain personal information about the user. Examples of personal information include: habits, routines, preferences, notes, lists, contacts, communications, interests, location histories, and other types of user information. After receiving explicit permission from the user, the assistant may store the personal information at user information data stores and, in the course of providing assistant services, make use of the personal information stored at the user information data stores.

The external systems and computing devices A–N and the assistant treat the information stored at the information stores so that the information is protected, encrypted, or otherwise not susceptible to unauthorized use. The information stored at the information data stores may be stored locally at each of computing devices A–N and/or remotely (e.g., in a cloud computing environment provided by the external systems and which is accessible via the network of FIG. 1).

In operation, the assistant may cause the automation devices to perform automation actions in response to user requests that include timing parameters. The timing parameters may be specified in a variety of ways. As one example, a user may request that the assistant perform

an automation action after a delay (e.g., turn off the lights in 5 minutes). As another example, a user may request that the assistant perform an automation action for a duration (e.g., turn on the lights for 5 minutes). As another example, a user may request that the assistant perform an automation action for a duration and after a delay (e.g., in 5 minutes, turn on the lights for 10 minutes).

The timing parameters can be based on the current time or some other event. Where the timing parameters are based on the current time, the assistant may read “from now” into the user request. For instance, if the user requests that the assistant “open the garage door in 5 minutes,” the assistant may interpret the request as “open the garage door in 5 minutes from now.” In some cases, the assistant may interpret the timing parameters as being based on the current time unless another event is specified.

Where the timing parameters are based on another event, the assistant may simply perform (or schedule performance) of the automation event timed from the occurrence of the other event. For instance, if the user requests that the assistant “close the garage door 4 minutes after I leave,” the assistant may refrain from action until determining that the user has left, 4 minutes after-which the assistant may cause the garage door opener to close. In addition to the event of leaving a location, some other examples of events on-which timing parameters may be based include, but are not limited to, turning on a device (e.g., “dim the kitchen lights to half 5 minutes after I turn on the TV”), arriving at a location (e.g., “turn on the lights when I get home”), weather based events (e.g., “turn the lawn sprinklers on for 30 minutes unless it is going to rain today”), etc.

By enabling users to specify timing constraints for the performance of automation actions, the assistant may provide enhanced functionality and allow for many new automation

device use cases. The above examples are just some use cases for the assistant architecture shown in FIG. 1, the assistant architecture has many other applications and use cases.